FROZEN SOIL IN SPITZBERGEN.

By W. WERENSKIOLD.

[Excerpt from *Geofisiske Publ.*, vol. 2, No. 10, Kristiania, 1922.]

In regions with a sufficiently low mean annual temperature, combined with slight snowfall, the subsoil is constantly frozen. A layer of snow acts as a good insulator, and the ground is thus protected against excessive cooling in countries with heavy snowfall.

Spitzbergen affords the natural condition for a formation of permanent frozen subsoil. The mean annual temperature is about − 8° (Centigrade), and the snow that comes during the winter, is blown together in heaps, mostly in cirques and other hollows. The snow is also to a great extent blown out of the valleys and deposited on the fiord ice.

If the temperature is supposed to rise uniformly with one degree centigrade per 40 metres, the layer of frozen subsoil—earth and rock—should attain the enormous thickness of about three hundred metres, or one thousand feet. In the Swedish coal mine (Sveagruvan) in Lowe Sound a temperature of 0°C. was actually found in a depth of about 320 metres below the surface, and 430 metres from the mouth of the level adit. The rock is quite dry.

During the summer the soil thaws to a depth of some 2 feet, and the ground is constantly water-soaked. The frozen soil is a very important factor in all sort of ground work, diggings, and foundations. Frost-safe cellars do not exist in this country; and if the stability of a stone wall or pillar must be absolutely certain, it must be founded on solid rock. The chief difficulty seems to be that a concrete wall, for instance, acts as a better heat conductor than the water-soaked soil, and may therefore cause thawing at the bottom. If the foundation is sufficiently deep in the frozen soil—5 feet or so—there is generally no danger.

The frozen soil continues for some distance under the sea bottom; but the upper limit slopes down at a quicker rate than the beach, and disappears farther out under the sea.

The conditions are somewhat different at different places, chiefly owing to the variable temperature of the sea water, and the profile of the beach. At the pier of the Swedish mine, the ice was found to stretch under the sea bottom to a distance of about 100 metres from the shore, according to information gathered at the place.

THE PRÖTT THEOREM.[1]

By F. LINKE.

[Abstract reprinted from *Science Abstracts*, Apr. 25, 1923, p. 174, § 429.]

By his study of psychometric tables and graphic representations of the connection between temperature and humidity of the air, C. H. Prött was led to the discovery of laws which on account of their easy applicability merit the attention of meteorologists. He maintains that in many cases of technique and hygiene the temperature and relative humidity of the air do not sufficiently characterize the thermal state of moist air, and even lead to false conceptions. What is much more important is to determine the total thermal content of the air, consisting on the one hand of free heat as revealed in the atmospheric temperature, and on the other hand of the heat latent in the aqueous vapour. This total thermal content is, he maintains, solely indicated by the reading of an aspiration wet-bulb thermometer. He therefore provided a wet-bulb thermometer with a corresponding scale and patented it in 1913 under the name of "Prött-meter." Especially important is the introduction of "relative saturation," instead of the hitherto customary "relative humidity." The former refers to the maximum humidity at the temperature of the wet-bulb thermometer, the latter to that at the temperature of the dry-bulb thermometer. The former refers to the maximum amount of aqueous vapour which the air can actually absorb without change of temperature, the latter to the aqueous vapour which it contains theoretically. There can be no doubt that the former is practically the more important. A mathematical working out of the laws, which does not lend itself to abstraction, is followed by various suggestions for their technical application.—*E. F.*

[1] *Meteorologische Zeitschrift*, Sept., 1922, pp. 267–272.

THE REGIONAL PECULIARITIES OF THUNDERSTORM OCCURRENCE IN NORTH GERMANY.[1]

By K. LANGBECK.

[Abstract reprinted from *Science Abstracts*, Apr. 25, 1923, pp. 174–175, §430.]

An inquiry based on material collected by the Preuss Meteorolog. Inst. from 1901 to 1910. In considering the question of the yearly and daily periods a system of comparison was adopted which attempted in the first place a general mean [percentage] distribution for the whole district under observation, and, secondly, to ascertain the "anomalies." The regional differences thus revealed lead to a point in connection with the origin of thunderstorms hitherto insufficiently considered, which touches the contrast between continental and oceanic climate, and finds an analogy on a small scale in the contrast between mountain and valley. The following questions were investigated: (1) A relative estimate of the different districts as regards the formation of storms; (2) the yearly period of storm occurrence; (3) the [percentage] distribution of storm direction. The influence of a climatic temperature contrast on the generation of electric phenomena which is revealed by the North German observations enables us to understand the general distribution of storm frequency on the earth. Wherever there are, owing to opposition between land and sea, mountain and valley, warm and cold air currents or ocean currents, or differences in temperature and humidity, there must be increased storm frequency. Exceptions under special climatological and aerological conditions may be explained by the absence in such cases of sufficient masses of warm, humid air.—*E. F.*

[1] *Meteorologische Zeitschrift*, Sept., 1922, pp. 257–263.

ATMOSPHERICS IN CARIBBEAN DURING THE SPRING OF 1923.

A letter under date May 21, 1923, received from the superintendent of the radiotelegraph department of the United Fruit Co., stationed at Swan Island, contains the following paragraph:

As mentioned in my former letter, atmospheric disturbances in this vicinity have been detrimental to our radio service so far this season;